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Mazdoor Kisan Shakti Sangathan

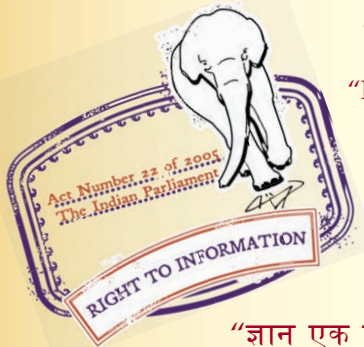
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“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 304 (1981): High Tensile Brass Ingots and Castings [MTD
8: Copper and Copper Alloys]



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Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

SPECIFICATION FOR
HIGH TENSILE BRASS INGOTS AND CASTINGS

(*Second Revision*)

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NEW DELHI 110002

Indian Standard

SPECIFICATION FOR HIGH TENSILE BRASS INGOTS AND CASTINGS (*Second Revision*)

Copper and Copper Alloys Sectional Committee, SMDC 11

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Indian Standard
SPECIFICATION FOR
HIGH TENSILE BRASS INGOTS AND CASTINGS
(*Second Revision*)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 24 April 1981, after the draft finalized by the Copper and Copper Alloys Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard was first published in 1952 and revised in 1961. In this revision only two grades have been retained. Of the three grades specified earlier, two were α - β brasses possessing similar physical properties. It was, therefore, decided to delete Grade 2 covered in the first revision. Grades 1 and 3 have been redesignated as HTB 2 and HTB 1, respectively. Slight modifications have been made in chemical composition for both the grades. Mechanical properties for chill casting of Grade HTB 1 have been incorporated.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the requirements for two grades of high tensile brass ingots for remelting purposes and castings.

2. SUPPLY OF MATERIAL

2.1 The general requirements relating to the supply of material are laid down in IS : 1387-1967†.

*Rules for rounding off numerical values (revised).

†General requirements for the supply of metallurgical materials (first revision).

3. CHEMICAL COMPOSITION

3.1 The material when analysed in accordance with IS : 3685-1966*, shall have the chemical composition as given in Table 1.

TABLE 1 CHEMICAL COMPOSITION

CONSTITUENT	PERCENT	
	Grade HTB 1	Grade HTB 2
Copper plus incidental nickel, <i>Min</i>	55	55
Manganese, <i>Max</i>	3.0	4.0
Aluminium	0.5-2.5	3.0-6.0
Iron	0.7-2.0	1.5-3.25
Tin, <i>Max</i>	1.0	0.20
Lead, <i>Max</i>	0.50	0.20
Silicon, <i>Max</i>	0.10	0.10
Total of other elements, <i>Max</i>	0.20	0.20
Zinc	Remainder	Remainder

4. MICROSTRUCTURE

4.1 If required, for the supply of material to Grade HTB 1 test pieces prepared from test samples as specified in 10.3 shall be etched and polished and shall be subjected to microscopic examination. The alpha phase derived from the average of at least 5 counts shall be not less than 15 percent of the total area.

5. MECHANICAL PROPERTIES

5.1 The material when tested in accordance with IS : 2654-1964†, shall have the mechanical properties as given in Table 2.

5.1.1 Should a tensile test piece break outside the middle third of its gauge length and the elongation percentage obtained is lower than the minimum specified, the test may at the option of the manufacturer, be discarded and another test made.

*Methods of chemical analysis of brasses.

†Method for tensile testing of copper and copper alloys.

TABLE 2 MECHANICAL PROPERTIES

(Clause 5.1)

MODE OF CASTING TEST PIECES	PROPERTY	GRADE HTB 1	GRADE HTB 2
Sand cast (separately cast)	Tensile strength, <i>Min</i> , MPa	470	740
	*0.2 percent proof stress, <i>Min</i> , MPa	170	400
	Elongation percent on gauge length of $5.65 \sqrt{S_0}$, <i>Min</i>	18	11
Chill cast	Tensile strength, <i>Min</i> , MPa	500	---
	*0.2 percent proof stress, <i>Min</i> , MPa	210	---
	Elongation percent on gauge length of $5.65 \sqrt{S_0}$, <i>Min</i>	18	---

*For information only.

NOTE — 1 MPa = 0.102 kgf/mm².

6. PRESSURE TEST

6.1 If the purchaser requires castings to be tested for pressure-tightness, this shall be stated in the enquiry and order. The number of tests, the nature of the test, the test pressure and the testing fluid shall be the subject of agreement between the manufacturer and the purchaser.

7. FREEDOM FROM DEFECTS

7.1 Ingots — The ingots shall be of uniform quality and reasonably free from slag, dross and other harmful contaminations.

7.2 Castings — The castings shall be free from harmful inclusions and cracks. Defects shall be repaired only if agreed to by the purchaser and the supplier. Any casting may be subsequently rejected for faults in manufacture revealed by machining operation notwithstanding that it has passed previously for chemical and mechanical properties.

8. SIZES AND SHAPE

8.1 Unless otherwise agreed to between the supplier and the purchaser, ingots shall be of weight 10 ± 1 kg.

8.2 The dimensions and shape of the castings shall be in accordance with the drawings. All surfaces marked for machining shall have sufficient allowance for that purpose but shall not be too excessive resulting in more machining and unnecessary increase in the weight of the casting. For those surfaces which are not to be machined and unless otherwise specified in the contract, the sectional thickness shall not exceed by more than 5 percent of the specified thickness, or 2 mm, whichever is more.

9. MARKING

9.1 The name, initials or trade-mark of the manufacturer and the cast number and grade of the material shall be cast or otherwise legibly marked by stamping on each ingot or casting, by which the manufacturer and the grade of the material may be identified. In the case of small castings where it is difficult to cast on or stamp all the details, the marking shall be shown in the drawings or as agreed to between the supplier and the purchaser.

9.2 The material may also be marked with the Standard Mark

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

10. SAMPLING AND CRITERIA FOR CONFORMITY

10.1 Lot — In any consignment, ingots/castings of the same grade (*see* Table 1) manufactured at the same place shall be grouped together to constitute a lot.

10.2 Sampling for Chemical Analysis — One sample shall be taken and analysed from each cast of 1 000 kg or part thereof of the ingots/castings. However, in case more frequent chemical analysis is required, the same shall be agreed to between the supplier and the purchaser. The sample for chemical analysis shall be taken by drilling or sawing in such a manner as to be representative of the entire cross-section.

Drillings and sawings from ingots/castings shall be obtained in accordance with the appropriate procedure specified in IS : 1317-1961*.

10.3 Sampling for Mechanical Properties — Three test bars shall be separately cast along with the castings for tensile strength for every 1 000 kg or part thereof of the casting. These test bars shall be cast to shape in accordance with 4.3.1.1 and Appendix B of IS : 1408-1968†. These test bars shall be of suitable size for turning them to the standard dimensions of the test piece as laid down in IS : 2654-1964‡.

10.4 Retest

10.4.1 If the sample drawn for chemical analysis fails to meet the requirements stipulated in the standard, two more tests shall be conducted on the same sample in order to confirm that the analysis has been done properly. If both the test results satisfy the relevant requirements, the lot shall be accepted; and if either of the retest fails, the lot represented shall be deemed as not complying with the standard.

10.4.2 Should a test piece fail to meet the requirements of the tensile test specified in the standard, two further test pieces which represent the same cast may be tested in the same manner. Should one of the further test pieces meet the requirements of the tensile test, the ingots or castings represented thereby shall be deemed to comply with the standard otherwise the lot shall be rejected.

11. INFORMATION TO BE GIVEN BY THE PURCHASER

11.1 This standard contains a number of clauses in which the purchaser is allowed to exercise an option. The list of information to be given by the purchaser in respect to these clauses is given in Appendix A.

A P P E N D I X A

(Clause 11.1)

INFORMATION TO BE GIVEN BY THE PURCHASER

A-1. Whether the purchaser wishes to inspect the material at the suppliers works (see IS : 1387-1967§).

*Methods of sampling non-ferrous metals for chemical analysis.

†Recommended procedure for inspection of copper-base alloy sand castings (first revision).

‡Method for tensile testing of copper and copper alloys (first revision).

§General requirements for the supply of metallurgical materials (first revision).

IS : 304 - 1981

A-2. The alloy grade required.

A-3. Whether information is required concerning the works analysis.

A-4. Detailed drawings of castings.

A-5. In the case of ingots, whether purchaser prefers any special size, shape and mass of the ingots.

A-6. Preparation of test piece for tensile testing.

A-7. Whether a pressure test is required. Details are subject to agreement with supplier.

A-8. Marking details.